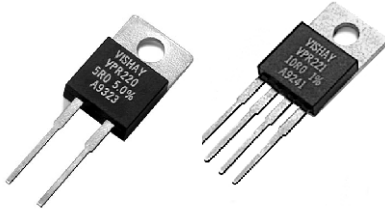


### Bulk Metal® Foil Technology Precision Foil Power Resistors in TO-220 Configuration with TCR of $\pm 2 \text{ ppm}/^\circ\text{C}$ , Tolerance of to $\pm 0.01 \%$ and Power Rating to 8 W



Any value at any tolerance within resistance range

Models VPR220 AND VPR221, made from Vishay Bulk Metal® Foil, offer low TCR, high stability, tight tolerance and fast response time in a small, molded resistor. Model VPR220 is a 2 lead device. Model VPR221 is a 4 lead Kelvin connected device. The 4 leaded version is highly recommended for precision applications requiring ohmic values of 100R or less.

**TABLE 1 - VPR220**

RESISTANCE RANGE ( $\Omega$ ) <sup>1</sup>	TIGHTEST TOLERANCE	TYPICAL TCR <sup>2</sup>	MAXIMUM TCR <sup>2</sup>
50 to 10K	$\pm 0.01 \%$	$\pm 2$	$\pm 5 \text{ ppm}/^\circ\text{C}$
25 to < 50	$\pm 0.02 \%$	$\pm 2$	$\pm 7 \text{ ppm}/^\circ\text{C}$
10 to < 25	$\pm 0.05 \%$	$\pm 2$	$\pm 10 \text{ ppm}/^\circ\text{C}$
5 to < 10	$\pm 0.1 \%$	$\pm 2$	$\pm 13 \text{ ppm}/^\circ\text{C}$

weight = 1 g maximum

**Notes**

1. Lower or high values available upon request
2. - 55 °C to + 125 °C, + 25 °C Ref.

**TABLE 2 - VPR221**

RESISTANCE RANGE ( $\Omega$ ) <sup>1</sup>	TIGHTEST TOLERANCE	TYPICAL TCR <sup>2</sup>	MAXIMUM TCR <sup>2</sup>
10 to < 500	$\pm 0.01 \%$	$\pm 2$	$\pm 5 \text{ ppm}/^\circ\text{C}$
1 to < 10	$\pm 0.02 \%$	$\pm 2$	$\pm 5 \text{ ppm}/^\circ\text{C}$
0.5 to < 1	$\pm 0.05 \%$	$\pm 2$	$\pm 5 \text{ ppm}/^\circ\text{C}$

weight = 1.2 g maximum

**Notes**

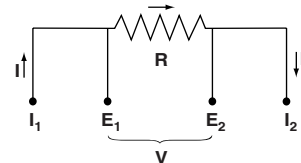
1. Lower or high values available upon request
2. - 55 °C to + 125 °C, + 25 °C Ref.

**FEATURES**

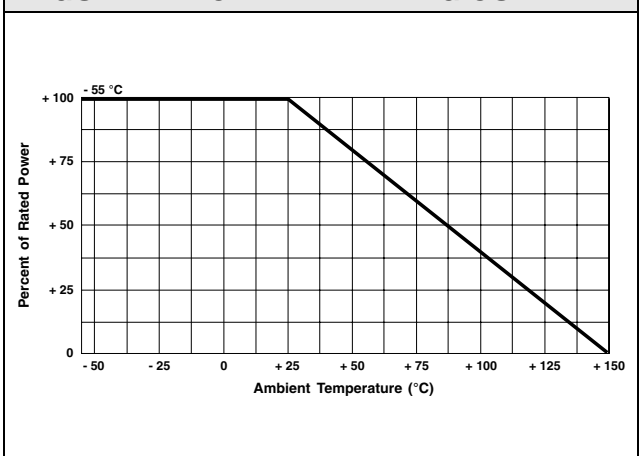
- Temperature Coefficient of Resistance (TCR):  $\pm 2 \text{ ppm}/^\circ\text{C}$  typical (- 55 °C to + 125 °C, + 25 °C Ref.)
- Tolerance: to  $\pm 0.01 \%$  (see tables 1 and 2)
- Electrostatic Discharge (ESD): above 25 000 V
- Load Life Stability:  $\pm 0.005 \%$  (25 °C, 2000 hours at Rated Power)
- Resistance Range: 0.5  $\Omega$  to 10 k $\Omega$
- Power Rating: 8 W chassis mounted (per MIL-PRF-39009)
- Non Inductive, Non Capacitive Design
- Rise Time: 1 ns without ringing
- Current Noise: < - 40 dB
- Voltage Coefficient: < 0.1 ppm/V
- Non Inductive: < 0.08  $\mu\text{H}$
- Non Hot Spot design
- Thermal EMF: 0.05  $\mu\text{V}/^\circ\text{C}$  typical
- Terminal Finishes Available: Lead (Pb)-free  
Tin/Lead Alloy
- Any value available within resistance range (e.g. 1K234)
- Prototype samples available from 48 hours. For more information, please contact [foil@vishay.com](mailto:foil@vishay.com)
- For better performances, please see VPR220Z and VPR221Z datasheets



**RoHS\***  
COMPLIANT



**FIGURE 1 - POWER DERATING CURVE**



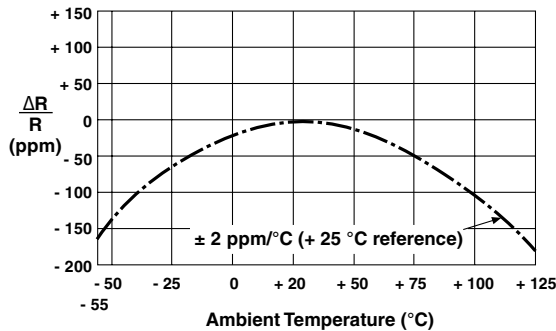
\* Pb containing terminations are not RoHS compliant, exemptions may apply

# VPR220, VPR221



Vishay Foil Resistors Bulk Metal® Foil Technology Precision Foil Power Resistors in TO-220 Configuration with TCR of  $\pm 2 \text{ ppm/}^\circ\text{C}$ , Tolerance of to  $\pm 0.01 \%$  and Power Rating to 8 W

**FIGURE 2 - TYPICAL TCR CURVE**



**TABLE 3 - SPECIFICATIONS**

Load Life Stability at 2000 h	$\pm 0.05 \%$ max $\Delta R$ under full rated power at $+ 25 \text{ }^\circ\text{C}$
Power Rating at $+ 25 \text{ }^\circ\text{C}$	8 W or 3 A <sup>1)</sup> on heat sink <sup>2)</sup>
	1.5 W or 3 A <sup>1)</sup> in free air
	Further derating not necessary
Current Noise	$< 0.010 \text{ } \mu\text{V (rms)}/\text{V}$ of applied voltage ( $- 40 \text{ dB}$ )
High Frequency Operation	
Rise time	1 ns without ringing
Inductance <sup>3)</sup> (L)	0.1 $\mu\text{H}$ maximum: 0.03 $\mu\text{H}$ typical
Capacitance (C)	1.0 pF maximum: 0.5 pF typical
Voltage Coefficient <sup>4)</sup>	$< 0.1 \text{ ppm/V}$
Operating Temperature Range	$- 55 \text{ }^\circ\text{C}$ to $+ 150 \text{ }^\circ\text{C}$
Maximum Working Voltage	300 V. Not to exceed power rating
Thermal EMF <sup>5)</sup>	0.15 $\mu\text{V}/^\circ\text{C}$ maximum (lead effect)

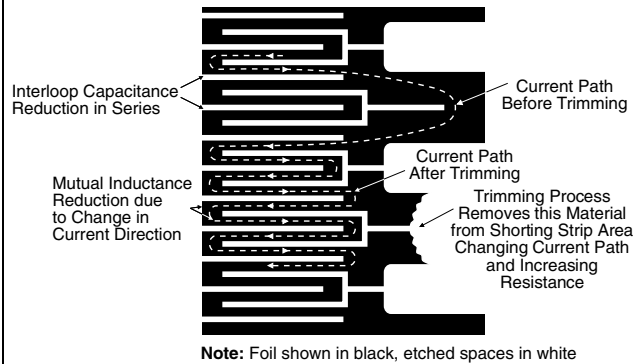
## Notes

1. Whichever is lower
2. Heat sink chassis dimensions and requirements per MIL-R-39009/1B:

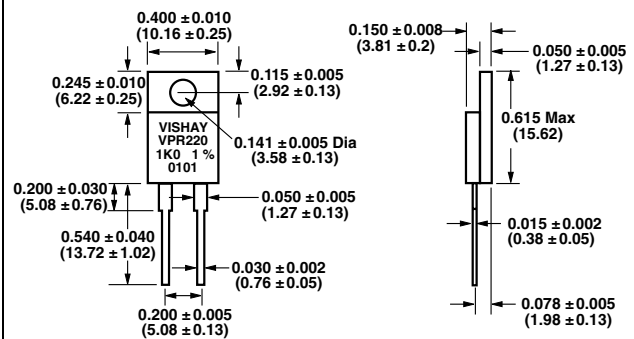
DIMENSION	INCHES	mm
L	6.00	152.4
W	4.00	101.6
H	2.00	50.8
T	0.04	1.0

3. Inductance (L) due mainly to the leads
4. The resolution limit of existing test equipment (within the measurement capability of the equipment, or "essentially zero")
5.  $\mu\text{V}/^\circ\text{C}$  relates to EMF due to lead temperature difference

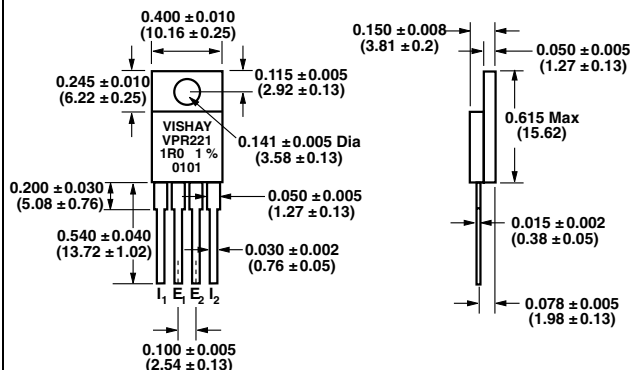
**FIGURE 3 - TRIMMING TO VALUES**  
(Conceptual Illustration)



**FIGURE 4 - VPR220 DIMENSIONS** in inches (millimeters)



**FIGURE 5 - VPR221 DIMENSIONS** in inches (millimeters)



Surface mount versions of these products are available. See datasheets for VPR220S, VPR 221S.

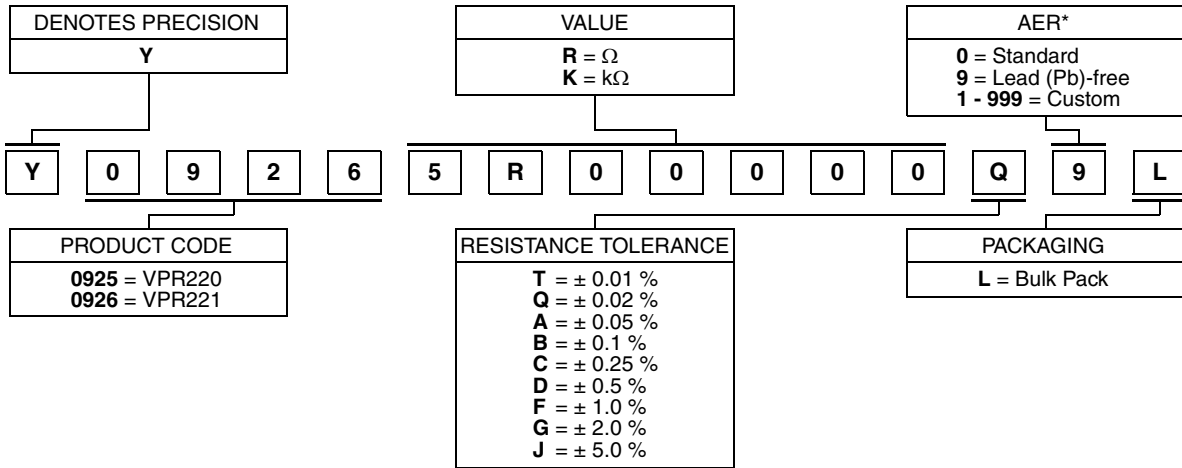


Bulk Metal® Foil Technology Precision Foil Power  
Resistors in TO-220 Configuration with TCR of  $\pm 2 \text{ ppm}/^\circ\text{C}$ ,  
Tolerance of to  $\pm 0.01 \%$  and Power Rating to 8 W

Vishay Foil Resistors

**TABLE 4 - GLOBAL PART NUMBER INFORMATION**

NEW GLOBAL PART NUMBER: Y09265R00000Q9L (preferred part number format)



FOR EXAMPLE: ABOVE GLOBAL ORDER Y0926 5R00000 Q 9 L:

TYPE: VPR221

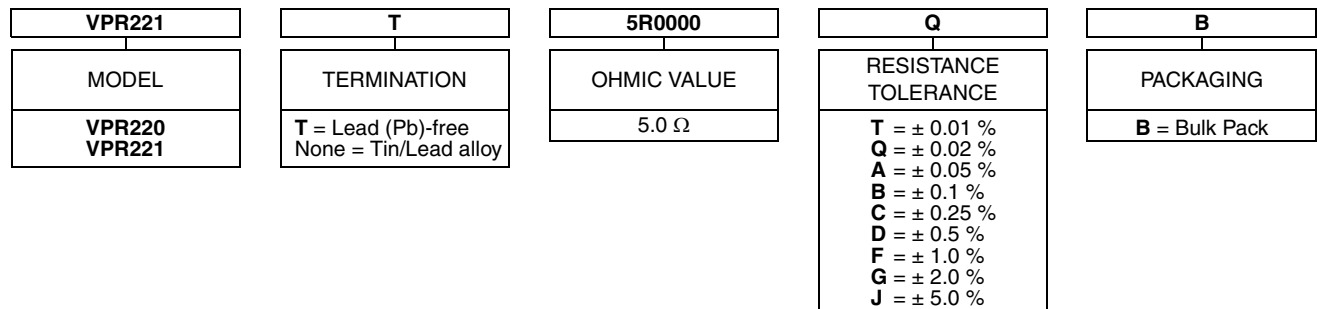
VALUE:  $5.0 \Omega$

ABSOLUTE TOLERANCE:  $\pm 0.02 \%$

TERMINATION: Lead (Pb)-free

PACKAGING: Bulk

HISTORICAL PART NUMBER: VPR221T 5R0000 Q B (will continue to be used)



**Note**

\* For non-standard requests, please contact Application Engineering.



### Disclaimer

All product specifications and data are subject to change without notice.

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